**Chapter 4 : Experimental Framework**

The research carried out is a four phase project. The first phase involves extraction of the features from the speech audio samples. This also involves making context windows out of the frames of the audio speech sample and calculating the mean and variance of several consecutive context frames to further capture the fluctuations in the signal. The features are also normalized to ensure every sample contributes equally. The second phase involves feature selection among the extracted features for collecting the best contributing features and inputting these features to the Initial Neural network. The Initial Neural network is then trained with the selected features. The third phase involves applying feature selection among all possible pairs of languages under consideration so as to extract the best contributing features for every pair. These features are then inputted to the Binary Neural Network and the Binary Neural Network is trained. The fourth and the final phase involves testing the samples against the Hybrid Neural Network. The third and the fourth phase are intertwined in the sense that the training and testing data are split according to  
K Fold Cross Validation which makes efficient use of data. The samples are divided for training and testing purposes. Features are extracted from the test samples. This also involves making context windows out of the frames and calculating the mean and variance of several consecutive context frames. The features are then normalized and the same features during the training/second phase are selected and then inputted to the Initial Neural Network. This network generates the top two best candidates for the given sample. These candidates are provided to the appropriate Binary Neural Network which selects the same features during the second training/third phase. These features are focused on classification between the two given languages. These features are then inputted to the Binary Neural Network which provides the final output.

**1) Feature Extraction**

**Dataset Description**

The data set used for the project purposes